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(54) Method of making a laminated armature core

(57) A laminated armature core 2 for a small rotary electric machine is made by helically winding a comb-like band formed from metal strip and having notches 1d at regular intervals along one edge and spaced teeth 1a extending laterally to the other edge. When the band is wound the notched edge defines a bore 2a which is later made a press-fit on a shaft member

and the teeth adopt a radial orientation. Axial slits 1b in the end of the teeth permit the divided ends to be splayed after winding to form arcuate shoes. In a preferred embodiment, two identical comb-like bands are made from a single strip by alternately notching the opposed edges at regular intervals and cutting the strip along a zig-zag path such that the teeth of one band are complementary with the spaces 1c' between the teeth of the other band.

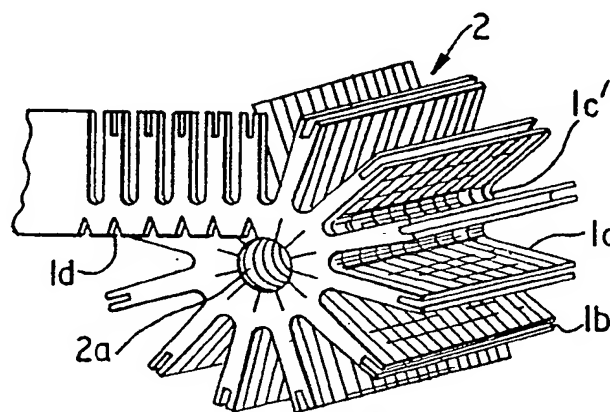


Fig.2.

The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

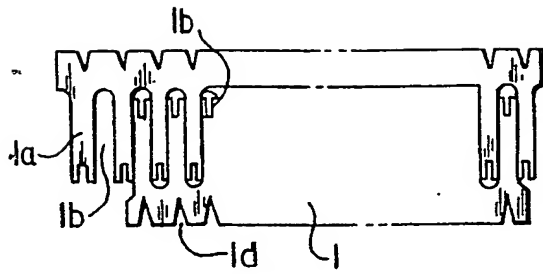


Fig.1.

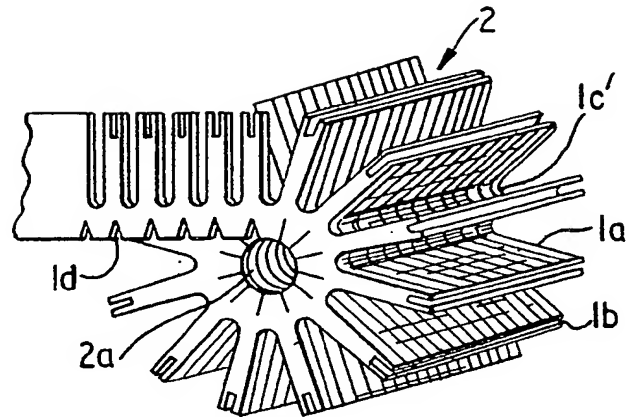


Fig.2.

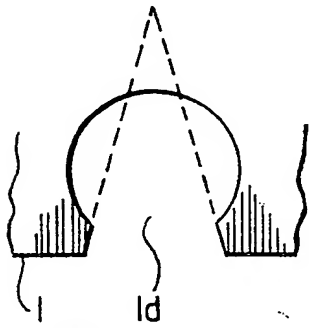


Fig.3.

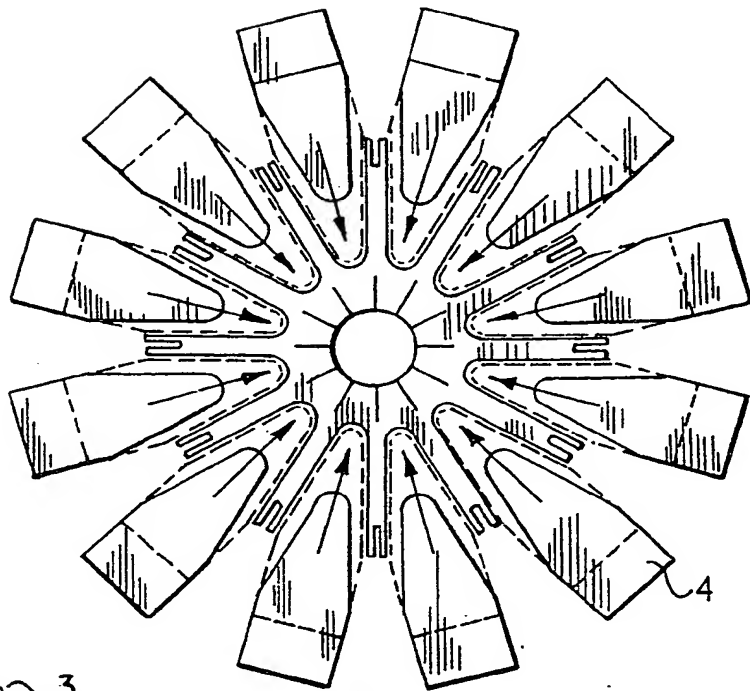


Fig.4.

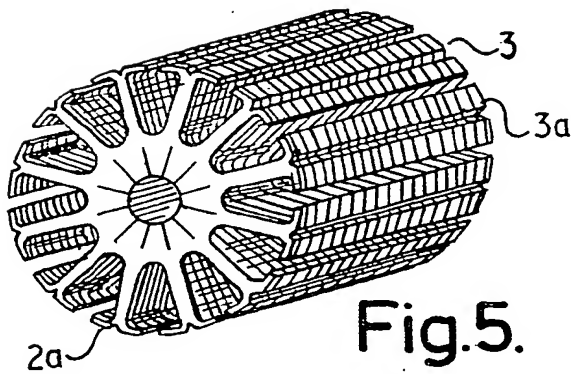


Fig.5.

SPECIFICATION

Method of making a laminated armature core

The present invention relates to a laminated armature core for electrical machines, particularly small machines. In the armature core of, for example, a vehicle windscreen wiper motor, the winding slots occupy a substantial part of the total cross-sectional area of the core. Because conventional methods of manufacturing laminated cores for such machines (such as disclosed in U.S.P. 3,225,424) involve merely removing material to form the slots, much wastage results.

One object of the present invention is to enable the manufacture of a laminated armature core with less wastage of material.

According to this invention, we propose a method of manufacture on armature core for a rotary electric machine comprising the steps of forming from metal strip a comb-like band having teeth spaced along the strip and extending laterally thereof to one edge, and notches at regular intervals along the other edge of the strip, and helically winding the said comb-like band to form a laminated hollow cylindrical body in which the notched edge defines the bore and the teeth extend radially outwardly.

The invention also includes an armature core when made by the method according to this invention.

Embodiments of the present invention will now be described by way of example with reference to the accompanying drawings of which:

Fig. 1 shows two comb-like bands formed from a single metal strip;

Fig. 2 illustrates how a comb-like band such as shown in Fig. 1 is wound to form generally cylindrical core;

Fig. 3 is an enlarged view of a detail of another comb-like band having a different notch shape;

Fig. 4 illustrates how the wound core shown in Fig. 2 is compressed; and

Fig. 5 shows a finished armature core according to the present invention.

As shown in Fig. 1, a steel strip is press-cut to form a couple of comb-like steel bands 1 having equally spaced slots 1c defining a plurality of teeth 1a each with a longitudinal slit 1b and, in corresponding positions along the back of the comb-like band, a plurality of notches 1d. The depth of the slit is limited by the teeth length and other factors relative to machine characteristics. The steel bands 1 are separated and each helically wound so that the teeth extend radially outwardly, as shown in Fig. 2, to form a core 2 of a desired height. The band 1 may be wound on a spool or an arbor having diameter slightly greater than and hence to form a bore 2a having a diameter slightly greater than the shaft onto which the core is fitted with one end anchored to the spool. During winding, the core 1 deforms such that the slots 1c become divergent toward the periphery and can be engaged by a sprocket to rotate the core stack for further winding or to align the teeth 1b along the core. To ensure good magnetic permeability of

the core, edge portions of the notches 1d are formed round, to make the contacting portion or discontinuous magnetic path of the core sheet as short as possible (see Fig. 3). When the spirally-wound core 2 reaches a predetermined axial length, the metal band 1 is cut.

In order to ensure a good press-fit between the shaft and the shaft receiving bore 2a, the diameter of the bore 2a is preferably made greater than that of the shaft and is, thereafter, compressed to reduce its diameter as shown in Fig. 4. During compression the shaft or an arbor having the same diameter as the shaft is inserted into the shaft receiving bore 2a and wedge-like members 4 are applied into the slots 1c to exert a radially inward force. The wedge-like members are preferably complementary in shape to the slots 1c so that all the revolutions of the helically-wound core 2 may conform to each other, after which the core 2 is solidly fixed by welding, preferably at the bottom of the slots 1c, along the entire length of the core. Thereafter, the grooves formed by the slits 1b of the aligned teeth 1a are spread in a known manner to form arcuate shoes or tooth edges 3a defining a cylindrical surface as shown in Fig. 5. Splaying may be achieved by inserting into successive grooves wedge-like tools having different edge angles. The arc length of the shoe 3a is not restricted by the width of the slot 1c but depends upon the depth of the groove 1b and can be any desired length. In an alternative embodiment, the core band 1 may be cut before it is wound.

After press fitting into the shaped or reduced shaft receiving bore, a shaft having serrated peripheral surface, conductors and insulators are wound into the slots 1c in a known manner.

CLAIMS

1. A method of manufacturing an armature core for a rotary electric machine comprising the steps of forming from metal strip a comb-like band having teeth spaced along the strip extending laterally thereof to one edge, and notches at regular intervals along the other edge of the strip, and helically winding the said comb-like band to form a laminated hollow cylindrical body in which the notched edge defines the bore and the teeth extend radially outwardly.
2. A method according to claim 1 wherein the teeth in one revolution of the strip align with teeth of an adjacent revolution so as to form ribs defining therebetween slots extending along the body.
3. A method according to claim 1 or claim 2 wherein an axial slit is formed in the end of each tooth, the end portions being splayed after winding of the strip to form arcuate shoes.
4. A method according to any one of claims 1 to 3 and comprising after winding of the strip, inserting a shaft member into the bore and radially compressing the body to secure to the shaft.
5. A method according to any one of claims 1 to 4 wherein two comb-like bands are formed

from a single metal strip by alternately notching the opposed longitudinal edges of the strip at regular intervals along its length, cutting the strip along a generally zig-zag path to form two
5 identical comb-like bands each having laterally extending teeth, the teeth of one band being complementary with the spaces between the

teeth of the other band.

6. A method of manufacturing an armature core
10 substantially as hereinbefore described with reference to the accompanying drawings.

7. An armature core when manufactured by the method according to any one of the preceding claims.

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